Alg. 2 Warm Up # 8-2 Solve:

1. $3|2x - 5| - 8 = -5$

2. $\sqrt{3x^2 + 11x} = 2$

3. Solve. Check for extraneous solutions.

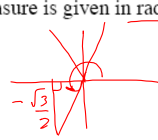
$$\sqrt{22x + 5} - \sqrt{2x} = 5$$

HW Questions:

Preview

7-90. Calculate the value of each expression below. Give an exact measurement, if possible. Each measure is given in radians.

a. $\sin(4)$

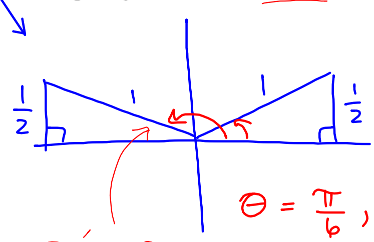



b. $\sin(\frac{4\pi}{3})$

$30° - 360°$

$\sin(-330°)$

7-91 Find the exact values of the angles that are solutions to the equation $\sin(\theta) = 0.5$. Express your solutions in radians.




$\frac{6\pi}{6}$

$\frac{\pi}{6} = 30°$

$\sin 30° = \frac{1}{2}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$

$\theta' = \frac{\pi}{6}$

$$\boxed{\begin{array}{l} \frac{\pi}{6} + 2\pi n; \\ \frac{5\pi}{6} + 2\pi n; \end{array}}$$

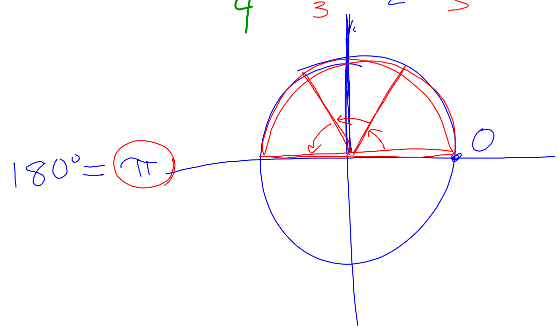
where n = integer

7-92. You have seen that you can calculate values of the sine function using right triangles formed by a radius of the unit circle. Values of $\theta$ that result in $30° - 60° - 90°$ or $45° - 45° - 90°$ triangles are used frequently on exercises and tests because their sine and cosine values can be found exactly, without using a calculator. You should learn to recognize these values quickly and easily. The same is true for values of $\cos\theta$ and $\sin\theta$ that correspond to the $x$- and $y$-intercepts of the unit circle.

The central angles that correspond to these "special" values of $x$ are 30°, 45°, 60°, 90°, 120°, 135°, 150°, 180°, 210°, 225°, 240°, 270°, 300°, 315°, and 330°. What these angles have in common is that they are all multiples of 30° or 45°, and some of them are also multiples of 60° or 90°.

Copy and complete a table like the one below for all special angles between 0° and 360°.

| Degrees | 0 | 30 | 45 | 60 | 90 | 120 | | |
|---|---|---|---|---|---|---|---|---|
| Radians | 0 | $\frac{\pi}{6}$ | $\frac{\pi}{4}$ | $\frac{\pi}{3}$ | $\frac{\pi}{2}$ | $\frac{2\pi}{3}$ | | |



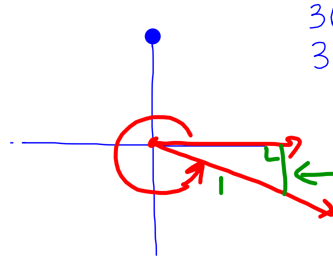

7-93. Draw a picture of an angle that measures 6 radians.

a. Approximately how many degrees is this?

b. Using only your picture, estimate the sine of 6 radians.

$360° = 2\pi$ rad

$360° \approx 6.28$ rad




← sine of 6 rad.

7-94. Evaluate each expression without using a calculator or changing the form of the expression.

a. $\log(10)$

b. $\log(\sqrt{10})$

c. $\log(0)$

d. $10^{(2/3)\log(27)}$

Think: "What exponent on the base 10 would give you $\sqrt{10}$?"

operations undo each other

$10^{\log_{10}(27)^{2/3}}$

7-95. What interest rate (compounded annually) would you need to earn in order to double your investment in 15 years?

$\left(27^{1/3}\right)^2$ $\quad \frac{1}{3}\cdot\frac{2}{1} \rightarrow 27^{2/3}$

$\left(\sqrt[3]{27}\right)^2$

$3^2$

$9$

7-94. Evaluate each expression without using a calculator or changing the form of the expression.

a. $\log(10)$

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7-95. What interest rate (compounded annually) would you need to earn in order to double your investment in 15 years?

$\frac{2\cancel{P}}{\cancel{P}} = \frac{\cancel{P}(1+r)^{15}}{\cancel{P}}$

$2 = (1+r)^{15}$

$\sqrt[15]{2} = 1 + r$

$r = \sqrt[15]{2} - 1$

$r \approx 0.0473 \rightarrow \approx 4.73\%$

7-96. Angle A is an obtuse angle with a sine of $\frac{3}{10}$. What is the tangent of angle A?

$\sin A = \frac{3}{10}$

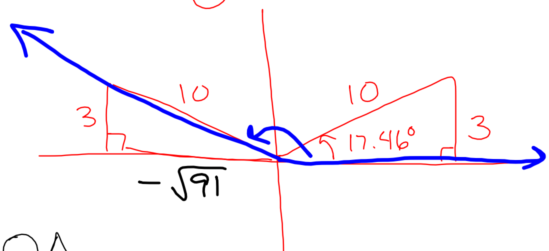
$A = \sin^{-1}\left(\frac{3}{10}\right) \approx 17.46°$

$\theta' \approx 17.46°$

SOH

def. obtuse

$90° < \theta < 180°$




TOA

$\tan A = \frac{3}{-\sqrt{91}} \cdot \frac{\sqrt{91}}{\sqrt{91}}$

$= -\frac{3\sqrt{91}}{91}$

7-97. Find the inverse functions for the functions given below.

a. $f(x) = \sqrt[3]{4x-1}$

b. $g(x) = \log_7 x$

$x = \log_7 y$

$7^x = y$

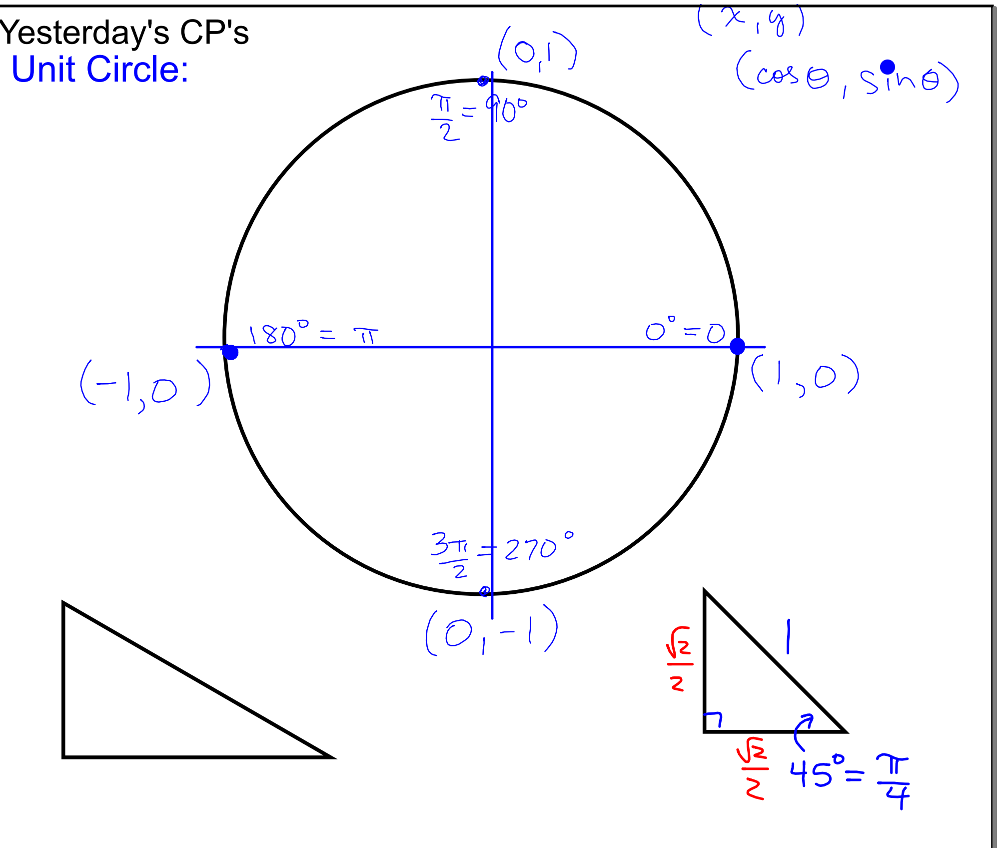
7-98. Solve each of the following equations.

a. $2(x-1)^2 = 18$

b. $2^x + 3 = 10$

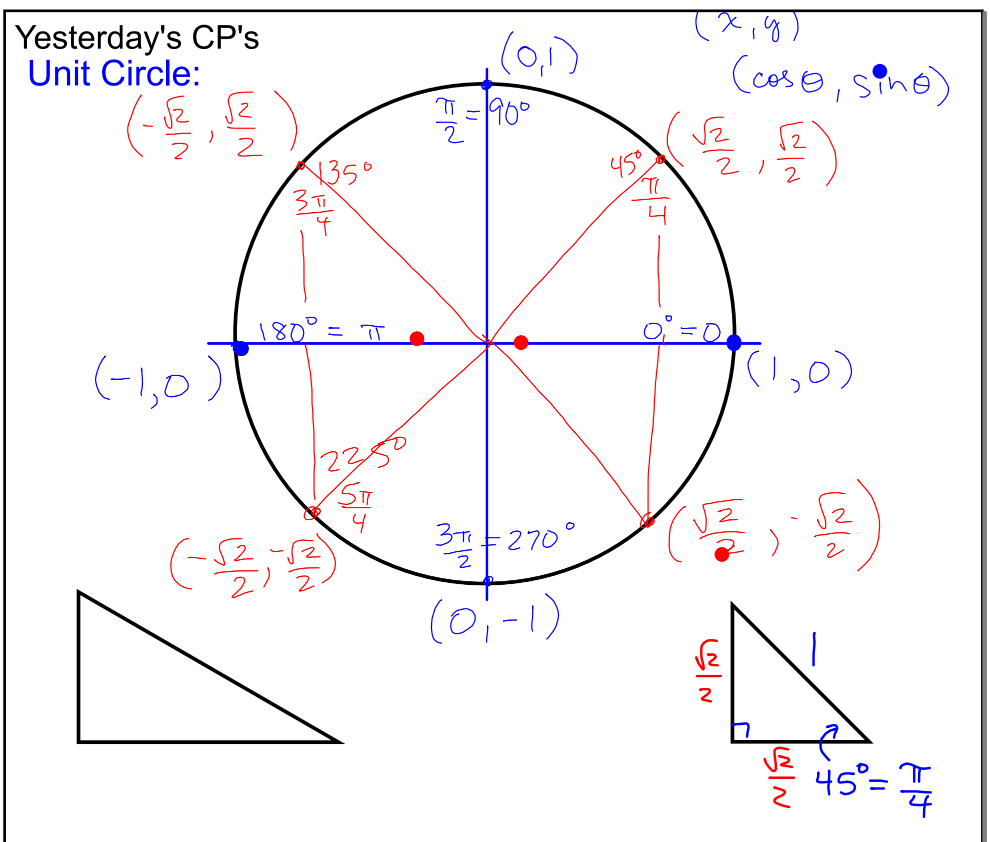
Yesterday's CP's

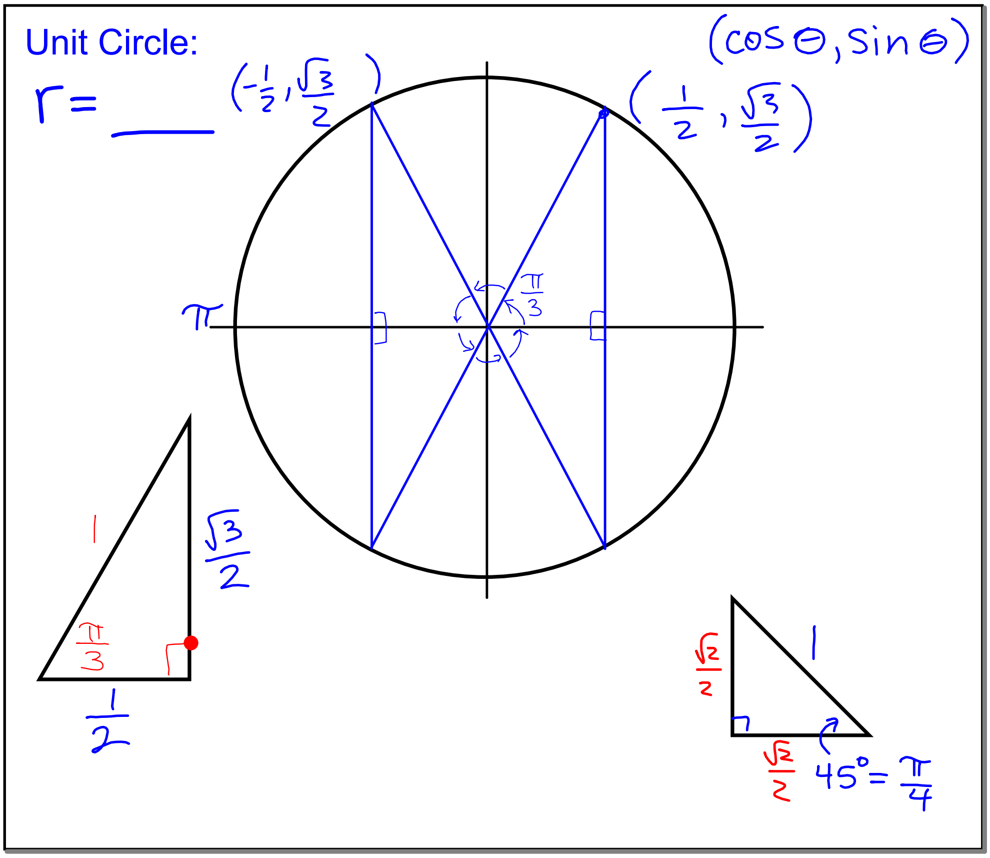
Unit Circle:

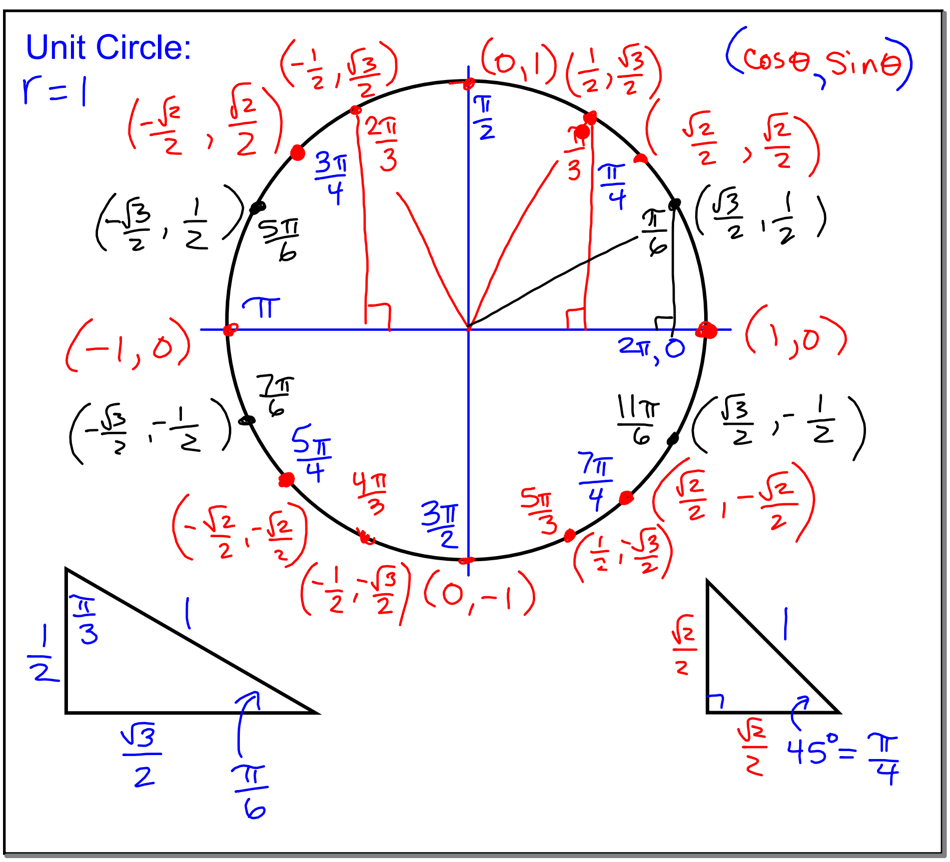



Yesterday's CP's

Unit Circle:




Unit Circle:
r= ___
(cos θ, sin θ)
$(-\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{1}{2}, \frac{\sqrt{3}}{2})$
π
$\frac{\pi}{3}$
1
$\frac{\sqrt{3}}{2}$
$\frac{\pi}{3}$
$\frac{1}{2}$
$\frac{\sqrt{2}}{2}$
1
$\frac{\sqrt{2}}{2}$
$45° = \frac{\pi}{4}$


Unit Circle:
r = 1
(cos θ, sin θ)
(0, 1)
$\frac{\pi}{2}$
$(\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(-\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$\frac{2\pi}{3}$
$\frac{3\pi}{4}$
$\frac{\pi}{3}$
$\frac{\pi}{4}$
$(-\frac{\sqrt{3}}{2}, \frac{1}{2})$
$\frac{5\pi}{6}$
$\frac{\pi}{6}$
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
π
(−1, 0)
2π, 0
(1, 0)
$\frac{7\pi}{6}$
$(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$
$\frac{11\pi}{6}$
$(\frac{\sqrt{3}}{2}, -\frac{1}{2})$
$\frac{5\pi}{4}$
$\frac{7\pi}{4}$
$(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
$\frac{4\pi}{3}$
$\frac{3\pi}{2}$
$\frac{5\pi}{3}$
$(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
$(\frac{1}{2}, -\frac{\sqrt{3}}{2})$
$(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$
(0, −1)
$\frac{\pi}{3}$
1
$\frac{1}{2}$
$\frac{\sqrt{3}}{2}$
$\frac{\pi}{6}$
$\frac{\sqrt{2}}{2}$
1
$\frac{\sqrt{2}}{2}$
$45° = \frac{\pi}{4}$

p. 338

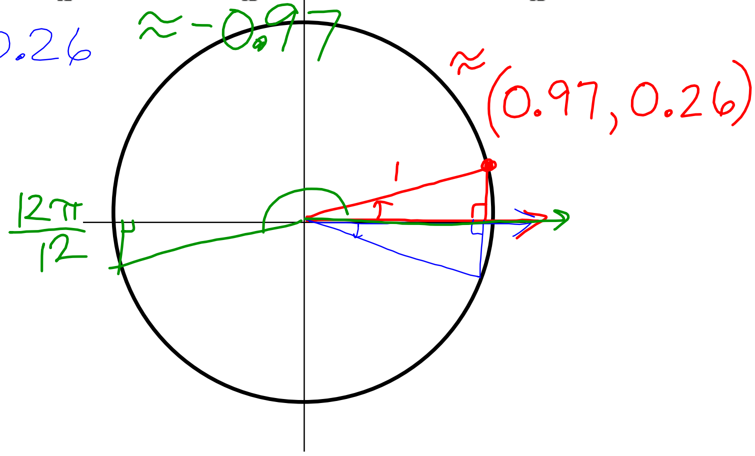
7-88. Draw a new unit circle, label a point that corresponds to a rotation of $\frac{\pi}{12}$, and put your calculator in radian mode.

a. What are the coordinates of this point, correct to two decimal places?

b. Use the information you found in part (a) to determine each of the following values: (Hint: Drawing each angle on the unit circle will be very helpful.)

*i.* $\sin(-\frac{\pi}{12})$   *ii.* $\cos\frac{13\pi}{12}$   *iii.* Challenge: $\cos\frac{7\pi}{12}$

$\approx -0.26$   $\approx -0.97$

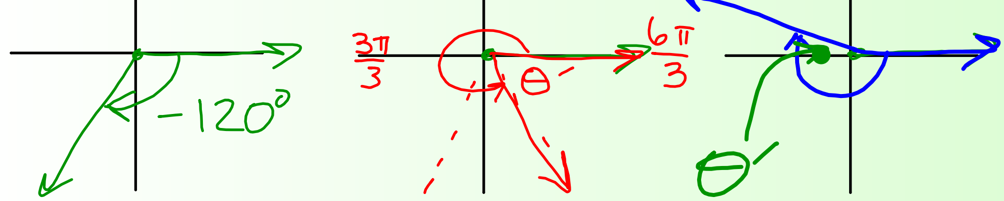



Draw each angle in Standard Position:
(starting at the positive x-axis)

State the reference angle, θ′, for each.

1) - 120°   2) $\frac{5\pi}{3}$   3) $-\frac{7\pi}{6}$

$\theta' = 60°$   $\theta' = \frac{\pi}{3}$   $\theta' = \frac{\pi}{6}$




Negative angles rotate down from the positive x-axis.

Use the conversion: $180^{\circ} = \pi$

convert to degrees

$$\frac{4\cancel{\pi}}{9} \cdot \frac{180^{\circ}}{\cancel{\pi}}$$

$$\frac{4}{\cancel{9}} \cdot \frac{\overset{20}{\cancel{180}}}{1}$$

$$80^{\circ}$$

convert to radians

$$\frac{75\cancel{^{\circ}}}{1} \cdot \frac{\pi}{180\cancel{^{\circ}}}$$

$$\frac{75\pi}{180} = \frac{15\pi}{36}$$

$$= \frac{5\pi}{12}$$

# Classwork: Tan WS

Alg 2B Classwork 7.1.6: Unit Circle Name: ____________________ Per:________

**1.** There are two key features to the unit circle: angle measures and coordinate points. In a few sentences, describe your method of building/finding each one WITHOUT memorizing it.

Angles (in radians) Coordinate Points $(x, y)$

|

**2.** On a unit circle, every $(x, y)$ point can be expressed as $(\cos\theta, \sin\theta)$. Using this information, state the value of the trig function at the given angle WITHOUT A CALCULATOR.

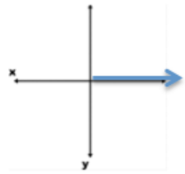
a. $\cos(45^{\circ}) =$ __________ b. $\sin(240^{\circ}) =$ __________

c. $\cos\left(\frac{3\pi}{2}\right) =$ ________ d. $\sin\left(\frac{11\pi}{6}\right) =$ _________

**3.** For each of the angles below, i) sketch the angle showing the direction of rotation and ii) calculate the reference angle, $\theta'$.

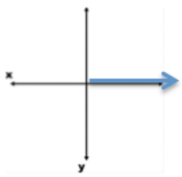
a. $-225°$


b. $315°$

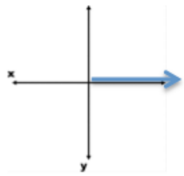



c. $65°$

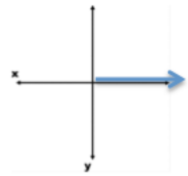

d. $\frac{7\pi}{4}$ radians




e. $-\frac{2\pi}{3}$ radians




f. $\frac{13\pi}{4}$



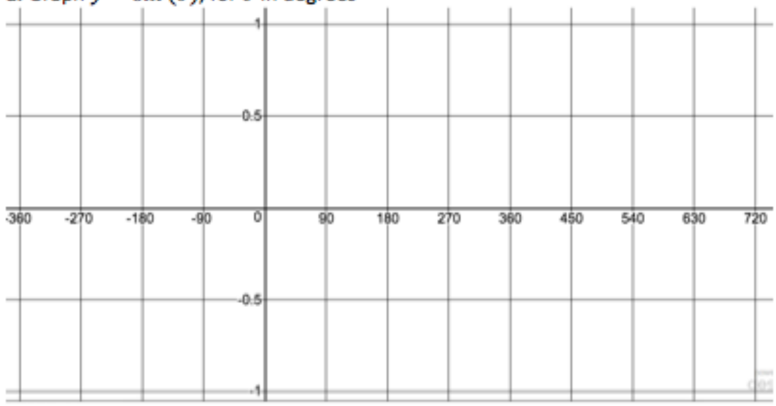

4. Without using a calculator, decide whether the equation is true or false. To do this, identify the quadrant and the reference angle for each. Then use a calculator to verify your decision.

a. $\sin 152° = \sin 28°$

b. $\cos\left(\frac{5\pi}{4}\right) = \cos\left(\frac{\pi}{4}\right)$

**4. Graphing $y = \sin(\theta)$ and $y = \cos(\theta)$:** Use your unit circle, not your calculator, to graph.

**a.** Graph $y = \sin(\theta)$, for $\theta$ in degrees

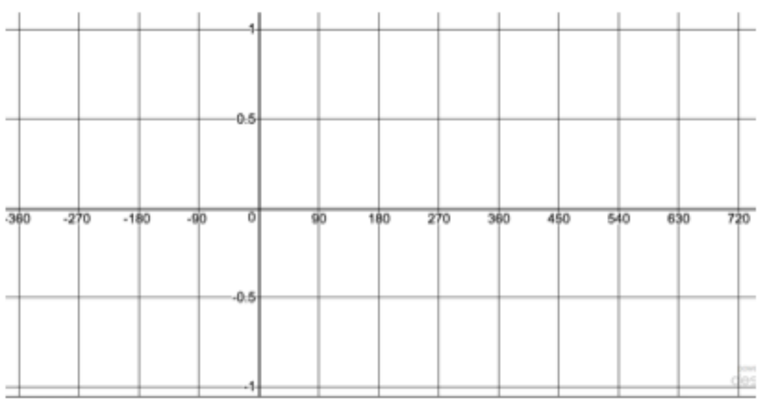



$\theta$-intercepts: ______________________ $y$-intercept: ______________________

Name the angles where there is a maximum: ________________ where there is a minimum: ____________

What is the length of one cycle? _______________________

b. Graph $y = \cos(\theta)$




$\theta$-intercepts: ______________________ $y$-intercept: ______________________

Name the angles where there is a maximum: ________________ where there is a minimum: ____________

What is the length of one cycle? _______________________

# HW: 7.1.6 Homework WS
(Purple)

Short Quiz Friday:
Solving Quadratics all three ways.